



Preface

The 1st Workshop on Photoluminescence in Rare Earths: Photonic Materials and Devices (PRE'05) was held in Trento, Italy, on 2–3 May 2005. The Workshop, promoted by the Italian Society of Optics and Photonics (SIOF) and the Italian Committee COST'01, was also sponsored by INTAS and by the Technical Committee TC-20 (Glasses for Optoelectronics) of the International Commission on Glass.

The Workshop was aiming at providing a forum for material scientists, chemists and physicists where to debate about the state of the art and the perspectives of the photonic materials based on rare earth ions. There was a significant majority of papers concerning the application of rare-earth-doped glasses and crystals to the development of optical amplifiers and lasers: this can be easily explained by the important role that both erbium-doped-fiber-amplifiers (EDFAs) and erbium-doped-waveguide-amplifiers (EDWAs) already play in existing fiberoptic communication systems. Moreover, the need for broader operational bandwidths of these amplifiers and the search for materials enabling amplification – or emission (e.g. by using upconversion phenomena) – in other wavelength bands fully justifies the interest for advanced materials containing other ions than Er, such as Nd, Ho, Tb and Tm.

It should also be recalled that rare-earth-doped materials have several other applications outside the area of optical amplifiers and lasers. These include optical switching or optical isolation by Faraday rotation (e.g. by using Ce-, Eu- or Tb-doped glasses), optical storage (Sm-, Eu-, Ho/Yb- or Tb-doped glasses), displays (e.g. by using long-lasting phosphorescence in Tb-doped glasses), scintillators, and optical sensing. Therefore, the field of rare-earth-doped materials is much broader than it could appear at first sight.

The Workshop was attended by more than 60 experts from eight countries, who presented original contributions on both fundamental photoluminescence properties and application-oriented materials investigations. A special session was devoted to the mechanism of optical losses in low-phonon-energy glasses for IR fibers. All the participants were appreciating very much the informal atmosphere, the warm hospitality, and the excellent scientific level. According to these feelings, it is very likely that the Workshop will be organized again in 2007.

Moreover, having the 2005 been labelled as the World Year of Physics and having marked the 100th anniversary of Albert Einstein's "miraculous year", the Workshop also celebrated the publication by Einstein in 1917 of the basis of the theory of spontaneous and stimulated emission.

This special issue of *Optical Materials* contains 21 refereed papers of the 47 which were presented at the Workshop. Most of the papers here deal with the theoretical and experimental investigation of the spectroscopic and optical properties of glasses (9), crystals (6), and nano-composite materials (2). Four papers are more closely related to the properties of optical waveguides.

We take this opportunity to thank the Institute of Photonics and Nanotechnologies (IFN – Trento Section) and the Nello Carrara Institute of Applied Physics (IFAC), both of the National Research Council of Italy (CNR), the Center for Scientific and Technological Research (ITC-IRST) in Trento, the Physics Department, Trento University, and the sponsors for their support to the organization of the Workshop. We also wish to thank all the authors for their valuable contributions and, last but not least, the members of the Organizing and Scientific Committees as well as all the reviewers for their precious work.

Guest Editors

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